

## HW 4 Part 2 Report

### What was the lowest resulting MSE value?

Out of the 12 models trained, the model with the lowest MSE was a K-Fold Ridge Regression model, which had an MSE of 5.69 on its validation test and a 9.58 on the test data.

### Compare the results for your linear regression model and ridge regression model.

The Linear Regression model had an MSE of 11.4 while the Ridge Regression model had an MSE of 9.6. This difference is likely due to the use of L2 Regularization in the Ridge Regression model which combats overfitting and overall results in a lower MSE.

### Which model was the best for this data?

The ridge regression model performed better than the linear regression model for the given data overall. The best K-Fold Ridge Regression had a slightly better MSE than the standard Ridge Regression model by 0.02.

### Discuss the use of Regularization and k-fold validation; and how they affect the training.

Utilizing regularization can mitigate overfitting to the training data by constraining the model coefficients, forcing them to remain small. K-Fold Validation enables us to find an optimal model by training it with the most representative data. Using both these techniques, we were able to train a model that outperformed both the Linear Regression model, and the standard Ridge Regression model. The K-Fold Ridge Regression model performed well in its validation test; however, when tested against the test set, it performed only 0.02 better than the standard Ridge Regression model. This indicates that the model possibly could have overfitted to the training data despite the use of L2 Regularization.

